ciently active form, and that even a good cement may be considerably improved by the addition of a suitable pozzolanic substance. White Portland cement made from raw materials exceptionally free from iron is not mentioned, but its manufacture is of some interest, and has been conducted with success on a technical scale.

The account of the consumption of energy in grinding is not quite correct. It is not true of most minerals that the energy required to separate crystals along their cleavages is very small, and clinker, although it may be in a state of internal strain, nevertheless possesses a degree of hardness which requires great energy to disintegrate it, as may be shown by applying direct pressure to single granules of clinker in a testing machine. There are several suggestive notes regarding possible improvements in the manufacturing processes. The author has long argued that the logical goal of improved manufacture should be the production of such a high temperature as will yield a fused product, in which case a higher percentage of lime could be used and a homogeneous cement obtained. Certain improvements in regard to fuel economy and to the recovery of potash are also suggested.

On the subjects of chemical analysis and mechanical testing the author speaks with authority, and the chapters dealing with these sections may safely be used as a laboratory guide, whilst their usefulness is enhanced by the inclusion of a number of the more important official specifications for Portland cement in force in various countries. The fact is mentioned that "a cement which will pass the British standard specification is at least as good as that acceptable under any of the foreign specifications."

The vexed question of the chemistry of Portland cement is well treated, but a good deal of space is occupied by an account of researches and speculations which have no more than an historical interest. It is not so widely known as it should be that the whole chemistry of silicates has been revolutionised by the brilliant work emanating from the Geophysical Laboratory at Washington, which has replaced guesswork by an accurate physico-chemical survey of the systems concerned. The triangular equilibrium diagram of the lime-silica-alumina system is now known with sufficient accuracy to serve as a practical guide in the cement laboratory. The study of setting, on the other hand, has not advanced very greatly beyond the stage reached by Le Chatelier. The author, in referring to the work of Stern, has overlooked the fact that the examination of clinker and cement by reflected light after etching has been used successfully by several workers, and that excellent photographs of the fine eutectic structures have been published, some of them in Japan.

These points might well receive attention in a future edition, and would still further increase the value of a very useful book.

C. H. Desch.

---

## Psychology, Normal and Subnormal.

(1) *Psychology of the Normal and the Subnormal.* By Dr. H. H. Goddard. Pp. xxiv+349. (London: Kegan Paul, Trench, Trubner, and Co., Ltd., 1919.) Price 25*s.* net.

(2) *Psychology and the Day's Work: A Study in the Application of Psychology to Daily Life.* By Prof. E. J. Swift. Pp. ix+388. (London: George Allen and Unwin, Ltd., 1918.) Price 10*s.* 6*d.* net.

(3) *The Child's Unconscious Mind: The Relations of Psychoanalysis to Education: A Book for Teachers and Parents.* By Dr. Wilfrid Lay. Pp. vii+329. (London: Kegan Paul, Trench, Trubner, and Co., Ltd., 1919.) Price 10*s.* net.

UNTIL the last half-century psychology was based almost exclusively upon the observation of a highly intelligent and highly civilised type of mind—usually the mind of the psychologist himself. Modern psychology owes its remarkable progress chiefly to two factors: first, to the addition of the method of experiment to the method of observation; and secondly—a factor the importance of which is less generally recognised—to the extension of these two methods to the study of simpler types of minds—of the minds of animals, of children, of savages, and of abnormal adults. The recent increase in the number of institutions for feeble-minded children has now provided psychology with the simplest human material available for investigation. Just as the ultra-rapid camera slows down the kinematographic picture of the swift movements of leaping and running, so Nature, by an arrest of the brain, retards the normal development of the child so that it can be observed and tested at leisure.

(1) The laboratory attached to the Vineland School for Feeble-minded Children—a laboratory unique of its kind, not only in America, but also in the world—has been utilised for such studies since 1906. Dr. Goddard's book provides a popular *résumé* of the conclusions progressively accumulated by the investigators in that laboratory. It is not a psychology merely of the mentally defective child. It is a psychology of the normal human mind as illuminated and illustrated by the observations upon the mentally defective. The volume, however, is by no means confined to observations carried out at Vineland. Indeed,

these are all too modestly alluded to. The exposition incorporates, in a clear and for the most part non-technical form, much of the most recent work done elsewhere upon the obscurer functions of the nervous system and of the mind.

The first two chapters give a simple but up-to-date account of the nervous system, admirably illustrated by nearly forty diagrams and photographs. Due emphasis is laid upon the importance attached by recent studies to the part played in the formation of mind and temperament by the activities of the "sympathetic" portion of the nervous system. Mental deficiency is then treated; it is described as an arrest in the development of intelligence, due to an arrest in the development of the nervous system at or before twelve years of age—that is, at some period before the onset of puberty. Memory, attention, and association are discussed in turn, and considered primarily as properties inherent in the nervous mechanism. The higher mental processes—action voluntary and involuntary, language, and (to adopt the author's spelling) "thot"—are then discussed as the complex results of the interaction of the fundamental properties of the nervous system. The affective side of experience—the emotions, simple and complex, and that elusive quality called temperament—receive full attention; and a lucid exposition is given of the views more particularly of Mosso, Cannon, and McDougall. To the results of psycho-analysis no reference whatever is made.

The first half of the book is thus an exposition of psychology from a physiological point of view. The second part proceeds to apply the views so expounded to certain theoretical and practical problems. A brief account is given of the distribution of intelligence, of its diagnosis by means of mental tests, of its relations to will, and to emotion. The book concludes with two chapters embodying applications of the results achieved to questions of scholastic and moral training.

(2) Prof. Swift's book consists of a series of popular essays upon the psychology of daily life. It is not a systematic survey of the whole field of mental hygiene. Rather the choice of subjects has been determined, as the preface acknowledges, by the author's personal interests. It includes, however, several important topics upon which recent investigation has thrown great light—topics which are closely related to everyday problems, although the relation has not always been recognised: for example, the psychical aspect of matters commonly considered to be primarily physiological, such as digestion, fatigue, and biological adaptation. There are also chapters upon matters the psychological and practical aspects of which are alike better recognised—testimony and rumour, memory-training, habit-formation, and learning generally. Illustrative material is drawn not only from the latest researches, but also from a wide reading of fiction, biography, and general literature. A couple of papers are inserted upon problems connected with unconscious processes of the mind, such as multiple personality and the curiosities of recollection. But here the point of view and the data are not always quite up-to-date.

(3) In the two foregoing books Dr. Goddard and Prof. Swift scrupulously avoid all mention of psycho-analytical doctrines. Dr. Lay's book barely refers to any others. His chapters attempt an interesting and even urgent task. The recent work of the psycho-analytic school has emphasised the important part played by unconscious tendencies in the formation of human personality. The simpler of these tendencies appear to be inherited, much as instincts are inherited by lower animals, and first emerge during the immature period we term childhood. The more complex are acquired through experience after birth; but even these are largely built up during the first few years of life. It follows that parents and teachers who view their task as comprising not merely the education of the intellect, but also the training of the character, should be instructed in the nature and properties of these unconscious tendencies, since, just because they are unconscious, they are so easily overlooked and so subtly persistent. The application, therefore, to educational problems of the better-established facts and principles embodied in the doctrines of psycho-analysis constitutes a fruitful field of discussion.

In his book Dr. Lay has set himself to attack this field. Twenty years of teaching in a secondary school, he tells us, has convinced him that "the modes of thinking on the part of children are irremediably (without the teacher's knowing of the effects of the unconscious) twisted, and that they are so by virtue of their numerous complexes." Unfortunately, Dr. Lay's own mode of thinking is apt at times to become, like his sentences, itself a little involved; and one may venture to doubt whether the teacher or the parent whose first introduction to psycho-analysis is obtained from the present volume will reach a very clear conception of the nature or the value of the new doctrines. He is required to think in very technical terms—of "*libido*," its "displacement," its "transference," and its "sublimation," of "identification" and its two forms of "projection" and "introjection," of "censorship" and "resistances" and "ambivalences" and "compensations." And for all these concepts very little empirical evidence is adduced.

Dr. Lay's method of demonstration inclines, too, almost exclusively to an *a priori* form: *"It is inconceivable* that all the sights, sounds, and other impressions we have had should not have an effect upon each other and so upon our present constitution . . ."; *"It seems in every way more rational to suppose* that conscious and unconscious thought and action are causally connected in both directions. . . ." This is scarcely the soundest type of scientific reasoning. Apart from a casual reference to William James (who incurs Dr. Lay's censure because he devoted to the sex-instinct only one page out of a thousand), pre-Freudian psychology is almost entirely ignored. That Ward and Stout and McDougall had constantly emphasised the importance of unconscious dispositions; that James, McDougall, and Shand had elaborated a widely accepted theory of instincts and emotions as the true basis of character; that the part played by conflict and repression in the formation of character had been succinctly stated by Stout; that the formation of a sentiment of maternal love has been described by Shand and McDougall in terms almost the same as Freud and Jung have used to describe the formation of parental complexes; that the nature and development of the sex-instinct had been closely studied by Stanley Hall and Havelock Ellis—of this the lay parent and the lay teacher learn nothing. Nor would they gather that for knowledge of the nature of the child's unconscious processes, of his complexes, his repressions, and his fantasies, the psycho-analyst is still almost entirely dependent upon the results gained by analysing the minds of abnormal adults, and can scarcely quote more than tiny fragments of first-hand observation made upon young and normal children. The psycho-analyst will perhaps contend that the earlier writers did not grasp the profound and all-pervading significance of the facts they partly formulated. But it is scarcely fair to suggest that upon such problems, before the new era of Freud had dawned, "no really scientific observations had been made." This is not the attitude or the method of Freud himself.

Yet, despite his shortcomings as a man of science and as a psychologist, Dr. Lay, as a practical teacher, has interspersed his somewhat diffuse and theoretical disquisitions with many shrewd observations upon child life, with many suggestive deductions from his master's principles, and with many opportune recommendations for home-training and for class-room procedure.

## Three Philosophers.

(1) *Aristotle.* By Dr. A. E. Taylor. Revised edition. (The People's Books.) Pp. 126. (London and Edinburgh: T. C. and E. C. Jack, Ltd.; T. Nelson and Sons, Ltd., 1919.) Price 1*s.* 3*d.* net.

(2) *Auguste Comte.* By F. J. Gould. (Life-stories of Famous Men.) Pp. v+122. (London: Watts and Co., 1920.) Price 3*s.* 6*d.* net.

(3) *Thomas Henry Huxley: A Character Sketch.* By Dr. Leonard Huxley. (Life-stories of Famous Men.) Pp. vii+120. (London: Watts and Co., 1920.) Price 3*s.* 6*d.* net.

At a time when constitutions are in process of adoption for so many unfamiliar areas on the map, it seems singularly appropriate that some attention should be diverted from such modern problems as relativity and Bolshevism to the older struggles and the ideas to which they gave rise. An excellent opportunity is provided by the three books under notice.

(1) Dr. Taylor's "Aristotle" is not quite in the same class as the others, for Aristotle's life occupies but little space. The author directs attention to the debt we owe to "the Stagyrite" for many of the commonest ideas in our language, and his avowed object is "to help the English reader to a better understanding of such familiar language and a fuller understanding of much that he will find in Dante, Shakespeare, Bacon, and Milton." It is a pity that he has not managed to avoid the frequent use of "logical" terms, probably unintelligible to those whose education has been merely commercial. It is possible that this usage has been deliberate, in order to support Aristotle's contention that a curriculum which includes only "useful" subjects does not constitute education at all—a doctrine that has not yet lost all its supporters. The book gives a fairly comprehensive sketch of Aristotle's progression, from "first philosophy" to physics, and on to practical philosophy—*i.e.* ethics and politics. It is interesting to recall that Aristotle objected equally to democracy and to oligarchy as understood by the Greeks, so that his ideal State would scarcely find favour with many of our present-day politicians. Dr. Taylor is impartial in dealing with points of difference between Aristotle and his quondam teacher Plato, but he does little to help to account for the ascendancy of Aristotle for so many centuries.

(2) It is a far cry from Aristotle to the nineteenth century, though we may regard many of the old Greeks, in spite of their mythology, as rationalists in much the same sense as Comte, though perhaps